

## RED FLEET RESERVOIR



### Introduction

Red Fleet Reservoir is a large reservoir at the base of the Uinta Mountains in Eastern Utah. It was built in the early 1980's with federal funds to relieve the residents of Ashley Valley of the cost of storing their own water. It has a state park with full recreational facilities. The reservoir is named for the Navajo Sandstone buttes surrounding the

reservoir that look like a fleet of ships. It is also called Tyzack Reservoir. Red Fleet Reservoir was created in 1980 by the construction of an earth-fill dam. It reached full capacity for the first time in 1983. The shoreline is

### Characteristics and Morphometry

Lake elevation (meters / feet)	1,710 / 5,608
Surface area (hectares / acres)	2,100 / 520
Watershed area (hectares / acres)	32,552 / 80,434
Volume (m <sup>3</sup> / acre-feet)	
capacity	32,082,660 / 26,020
conservation pool	4,932,000 / 4,000
Annual inflow (m <sup>3</sup> / acre-feet)	3.29 x 10 <sup>7</sup> / 26,670
Retention time (years)	1
Drawdown (m <sup>3</sup> / acre-feet)	
Depth (meters / feet)	
maximum	44 / 145
mean	15 / 50
Length (kilometers/ miles)	2.7 / 1.7
Width (kilometers / miles)	1.0 / 0.6
Shoreline (kilometers / miles)	24.7 / 15.4

### Location

County	Uinta
Longitude / Latitude	109 25 19 / 40 34 31
USGS Map	Donkey Flat 1965
DeLorme's Utah Atlas & Gazetteer	56, C-3, Pg 57, C-4
Cataloging Unit	Ashley-Brush Creeks (16060002)

owned by the State of Utah, and public access is unrestricted. Consumptive water uses are irrigation (70%) and culinary (30%). Nonconsumptive uses are recreation and habitat for both aquatic and riparian life. Water use is not expected to change in the foreseeable future.

### Recreation

Red Fleet Reservoir is accessible from US-191 (formerly U-44) between Flaming Gorge and Vernal.

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north of Vernal for about nine miles to the road to the reservoir, and go west on this road for about two miles. A boat launch area is on the right on a gravel road shortly after turning off US-191, but the main park facility is further east. Usage fees are charged for use of all park facilities. The route to the park is well marked.

Fishing, boating, swimming, camping, jet skiing, picnicking, hiking, and water skiing are all popular. The fleet of sandstone buttes provide a beautiful backdrop to the blue water of the reservoir.

Recreational facilities are well developed at Red Fleet State Park. There are 29 campsites, a swimming beach, a picnic table, a concrete boat ramp, modern rest rooms, sewage disposal, and a fish cleaning station. Because the reservoir and park are relatively new, relatively few recreationalists are familiar with it. In 1992, 30,238 people visited the park, ranging from 342 in February to 6,286 in July. At present, the park receives considerably less use than nearby Steinaker State Park, but attendance figures are expected to equilibrate as recreationalists become better acquainted with this park.



There is another state park at Steinaker Reservoir, USFS campgrounds north of the Steinaker along US-191, and private campgrounds nearby in Vernal (see info box).

### **Watershed Description**

Red Fleet Reservoir is an impoundment of Big Brush Creek at the edge of the Uinta Mountains. The dam was built where Big Brush Creek cuts through hogback ridges of the sedimentary strata that were steeply uplifted as the Uinta Mountains bulged upwards. The resistant strata are ideal for dam construction, because only a small notch needs to be filled to flood a large area. Red Fleet Dam as well as Steinaker Dam are built in such notches. Navajo Sandstone is the layer exposed at the upstream half of the reservoir resulting in lakeside topography that is similar to Lake Powell. The reservoir is in dry, relatively low elevation desert. Sagebrush and other desert vegetation

surround the reservoir, while just a few miles away (but 4,000 feet higher) the coniferous forests of the Uintas begin.

The large, natural watershed originates above Oak Park Reservoir in the Uinta Mountains. This is an area of heavily forested mountains, with the Precambrian rocks underlying the soil. As Big Brush Creek flows down from Oak Park, it reaches younger softer sedimentary rocks, into which it has eroded a deep gorge. The creek disappears into the bedrock at one point, reappearing as numerous springs lower in the watershed. Little Brush Creek also flows into Big Brush Gorge by the same means.

The deepest portion of the gorge is the near vertical-walled section in Weber Sandstone. The gorge ends at the Potash mile at the US-191 crossing, then slices through the strike valleys where Red Fleet Reservoir has impounded the stream. The drainage also includes segments of the strike valleys east and west of the reservoir.

The watershed high point, Trout Peak, two miles east of Trout Creek Peak, is 3,240 m (10,629 ft) above sea level, thereby developing a complex slope of 4.8% to the reservoir. The average stream gradient in the Big Brush Creek is 3.8% (201 feet per mile). The outflow is Big Brush Creek, but a pumping station immediately below the dam transfers water into a pipeline to Ashley Creek, providing irrigation and culinary water to Ashley Valley.

The watershed is made up of high mountains, foothills, plateaus, badlands and valleys. The soil associations that compose the watershed have not been determined by the Division of Water Quality.

The vegetation communities consist of pine, spruce-fir, oak-maple, pinyon-juniper, saltbrush, shadscale, greasewood and sagebrush-grass. The watershed receives 25 - 64 cm (10 - 25 inches) of precipitation annually. The frost-free season around the reservoir is 120 - 140 days per year.

Land use is private grazing land at lower elevations, multiple use on USFS and BLM land, and intensive recreation in the area immediately around the reservoir and at Oaks Park Reservoir. The Potash mine occupies several square miles immediately above the reservoir.

### **Limnological Assessment**

The water quality of Red Fleet Reservoir is very good. It is considered to be moderately hard with a hardness concentration value of approximately 128 mg/L (CaCO<sub>3</sub>). Although there are no overall water column concentrations that exceed State water quality standards there are reported violations of parameters near the bottom of the lake. These parameters include phosphorus, dissolved oxygen and temperature. Although it is evident that the average water column

# LAKE REPORTS

## Limnological Data

Data sampled from STORET site: 593766, 593773, 593765.

Surface Data	1989	1990	1991	1992
Trophic Status	M	M	M	O
Chlorophyll TSI	38.95	-	40.16	33.52
Secchi Depth TSI	48.14	45.69	49.16	51.77
Phosphorous TSI	40.62	38.73	39.16	27.36
Average TSI	42.57	42.21	42.83	37.55
Chlorophyll <i>a</i> (ug/L)	2.2	-	2.9	1.6
Transparency (m)	2.2	2.7	2.5	1.9
Total Phosphorous (ug/L)	13	11	11	6
pH	8.7	8.3	8.3	8.4
Total Susp. Solids (mg/L)	1.5	1.5	3	3
Total Volatile Solids (mg/L)	-	-	3	-
Total Residual Solids (mg/L)	-	-	13	-
Temperature (°C / °f)	20/69	20/68	20/68	20/68
Conductivity (umhos.cm)	309	311	257	223

## Water Column Data

Ammonia (mg/L)	.02	.03	.04	.03
Nitrate/Nitrite (mg/L)	-	0.11	.04	.06
Hardness (mg/L)	146	-	134	105
Alkalinity (mg/L)	101	95	87	79
Silica (mg/L)	-	-	2.9	-
Total Phosphorous (ug/L)	15	14	16	12

## Miscellaneous Data

Limiting Nutrient	N	N	P	P
DO (Mg/l) at 75% depth	2.5	1.6	3.4	4.6
Stratification (m)	10-12	NO	6-7	4-6
Depth at Deepest Site (m)	22.2	16	26	8

productivity. The reservoir does stratify as indicated in the July 1, 1993 profile. As the season progresses the stratification becomes stronger and more pronounced.

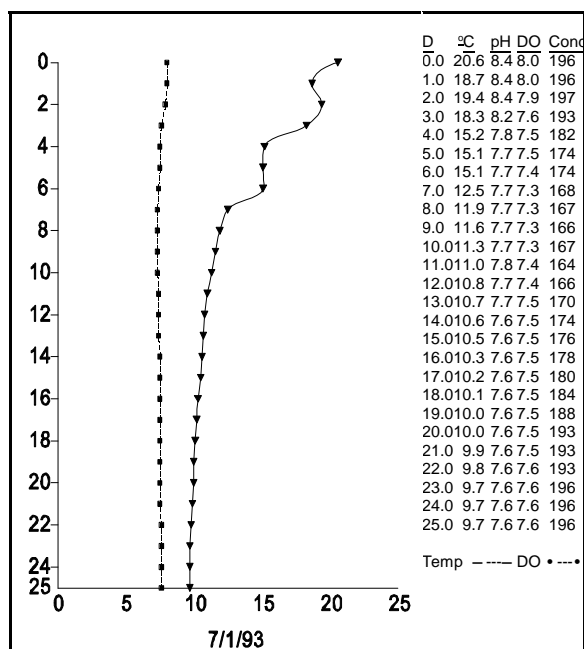
According to DWR no fish kills have been reported in recent years. The reservoir supports a population of rainbow trout (*Oncorhynchus mykiss*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), brown trout (*Salmo trutta*), flannemouth sucker (*Catostomus latipinnis*) and mountain sucker (*Catostomus platyrhynchus*). The largemouth bass and bluegill were illegally stocked soon after the reservoir was built, and have caused a substantial decline in trout populations. The DWR has considered treating the reservoir to eliminate the bass, but apparently has not done it yet. In addition to other native populations of Brush Creek, brook trout are occasionally found in the reservoir.

Phytoplankton in the euphotic zone include the following taxa (in order of dominance)

Species	Cell Volume% Density (mm <sup>3</sup> /liter)	By Volume
<i>Desmidium sp.</i>	0.278	50.56
<i>Dinobryon divergens</i>	0.146	26.70
<i>Aphanizomenon flos-aquae</i>	0.1	0.5
19.21		
<i>Harpochytrium sp.</i>	0.008	1.52
Pennate diatoms	0.007	1.21
<i>Ankistrodesmus falcatus</i>	0.004	0.79
Total	00.548	

concentration of total phosphorus has never exceeded the State pollution indicator criteria of 25 ug/L, on occasion values have been reported in excess at various depths in the water column. There are no indications that nutrient concentrations are a problem in the reservoir. Dissolved oxygen deficiencies occur later in the year after the reservoir has stratified. It is not uncommon to oxygen limited condition in the bottom 7 meters of the water column. On occasion dissolved oxygen depletions have been more extensive but not as a regular occurrence. Late in the summer it is common for the temperature in the epilimnion to exceed the criteria for a cold-water fishery. The increase in water temperatures near the surface and the decrease in dissolved oxygen in the lower depths of the reservoir can lead to a situation where the fish are squeezed into a region in the middle of the reservoir. This area may become reduced enough to impact the current fishery present in the reservoir.

Current data suggest that the reservoir is currently a nitrogen limited system. TSI values indicate the reservoir is borderline oligotrophic-mesotrophic in a state of low



Shannon-Weaver [H']	1.17
Species Evenness	0.65
Species Richness	0.25

The phytoplankton community is dominated by the presence of desmids and flagellates and some blue-green algae that are capable of fixing nitrogen in a nutrient limited system.

### Pollution Assessment

Nonpoint pollution sources include grazing, logging, recreation, and mining.

Grazing takes place throughout the watershed, but not in the vicinity of the reservoir.

Some of the heaviest logging in Utah takes place in this watershed, with large timber sales in the Oaks Park and East Park areas. Much of the watershed has been logged in fairly recent history, and the forest has only begun to recover. Large meadows have replaced thick forests.

Vernal Phosphate is a large mining operation along Big Brush Creek west of US-191. It practices careful revegetation of disturbed areas and has a large settling pond to remove solids from runoff. Nonetheless, heavy rains can wash substantial amounts of sediment from the watershed into the reservoir.

There are no point sources of pollution in the watershed.

### Beneficial Use Classification

The state beneficial use classifications include: culinary water (1C), recreation bathing (swimming) 2A, boating and similar recreation (excluding swimming) (2B), cold water game fish and organisms in their food chain (3A) and agricultural uses (4).

#### Information

##### Management Agencies

Uinta Basin Association of Governments	722-4518
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146

##### Recreation

Dinosaurland Travel Region (Vernal)	789-6932
Vernal Chamber of Commerce	789-1352
Red Fleet State Park	789-4432
Mammoth R.V. Park (Vernal)	789-9309
Campground Dina (Vernal)	789-2148

##### Reservoir Administrators

Department of the Interior	524-5436
CUP	226-7100